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Environmental
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Examen des évaluations
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Publications

GUIDELINES FOR PREPARATION OF AN
ENVIRONMENTAL IMPACT STATEMENT
FOR THE DEMPSTER LATERAL PIPELINE
YUKON TERRITORY AND NORTHWEST TERRITORIES - CANADA

ISSUED BY THE
ENVIRONMENTAL ASSESSMENT PANEL

CHAIRMAN J. Klenavic
L. Chambers
M. Hawkes
J.A. Heginbottom
J.P. Kelsall
R.G. Morrison
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PANEL SECRETARY P.J. Duffy

DECEMBER, 1978

ENVIRONMENTAL ASSESSMENT
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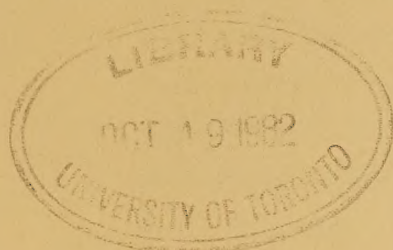
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TABLE OF CONTENTS

	<u>Page</u>
1. INTRODUCTION	1
2. SCOPE	3
3. DEFINITION OF TERMS	4
4. OVERVIEW SUMMARY	6
5. PROJECT SETTING	7
5.1 Declaration and Objective	7
5.2 The Need	7
5.3 Alternatives	8
5.4 Associated Projects	8
6. DESCRIPTION OF THE PROPOSED PROJECT	9
6.1 Pre-construction	10
6.2 Construction	10
6.3 Post-Construction Restoration	13
6.4 Operation and Maintenance	14
6.5 Abandonment	15
7. EVALUATION OF ALTERNATIVES	15
8. ENVIRONMENTAL SETTING	15
8.1 Climate	16
8.2 Terrain	17
8.3 Hydrology and Limnology	17
8.4 Vegetation	18
8.5 Fish and Wildlife	19
9. LAND, RESOURCE, DEMOGRAPHIC AND SOCIAL SETTING	20
9.1 Land and Resource Use	21
9.2 Demography and Social Setting	22
9.3 In-Migration and New Infrastructure	22
10. DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS	23
11. MITIGATION OF IMPACTS	24
12. RESIDUAL IMPACTS	24
13. ASSOCIATED PROJECTS	25
14. ANNEXES	26
Appendix A	26

1. INTRODUCTION

The Environmental Assessment and Review Policy of the Government of Canada requires that proposed projects initiated or funded by the federal government or with federal lands involved, and which are likely to have significant adverse environmental effects, be submitted to an Environmental Assessment Panel for review prior to the issuance of the necessary authorities to proceed. The Panel, formed under the mandate of the Minister of the Environment, reviews an Environmental Impact Statement (EIS) which is prepared by or for the Proponent of the project, and is submitted by an Initiator department. Following a public and technical review of the EIS, the Panel prepares a report for the Minister of the Environment.

The Project for which these guidelines are prepared is the construction and operation of a pipeline for the delivery of natural gas from a Mackenzie Delta gas processing plant to the Alaska Highway Gas Pipeline with a link-up near Whitehorse, Yukon. The route will follow closely the Dempster Highway and the Klondike Highway. The scope of the Project is more precisely defined in Section 2.

The Initiator for the Dempster Lateral Pipeline Project is the Department of Indian Affairs and Northern Development. The definitions of these and other terms used in this document are presented in more detail in Section 3. These

guidelines have been prepared by the Environmental Assessment Panel.

Sections 4 through 14 outline the content of the EIS which the Panel wishes to receive. The Proponent is responsible for the organization, content and completeness of the EIS. The Proponent is expected to observe the intent rather than the letter of the guidelines and to make every effort to identify and describe all environmental impacts likely to arise from the Project, even for situations not explicitly identified in these guidelines. In preparing this document, the Proponent must take into consideration information deficiencies identified in the hearings of the Alaska Highway Gas Pipeline Proposal held under the Environmental Assessment and Review Process and which resulted in the Preliminary Report to the Minister (July 27, 1977).

Section 4 calls for an Overview Summary, suitable for review by executives, the media and the public. It will capture in brief the salient environmental impacts of the Project and the efforts that will be made to identify and quantify, avoid or mitigate them.

Sections 5 and 6 outline the basic information requirements for the Project from initiation to abandonment, including contingency planning. Sections 8 and 9 outline existing environmental features including current resource use activities. Section 10 calls for the identification of likely

environmental impacts resulting from the interaction of the Project activities as described in Section 6 on the environmental features as described in Section 8. Measures proposed to avoid, mitigate or counteract the undesirable impacts, or to enhance desirable effects, are to be discussed in Section 11. Section 12 requires the identification, and quantification where possible, of residual impacts remaining after all mitigating measures have been taken. An assessment should be made of their significance and of any information deficiencies that may affect the validity of the EIS. This Section calls for an identification and assessment of critical information deficiencies and for terms of reference for studies to obtain information necessary to complete the assessment. The Appendices, Section 14 outline references and source information used to support the development and preparation of the EIS.

2. SCOPE

These guidelines are intended to apply to the entire Project, including pumping and compressor stations and associated works from preconstruction activity and including abandonment. All routing, construction and operations, and scheduling and design alternatives which are under active consideration at the time of the preparation of the EIS are considered to be parts of the Project. All construction and operational support activities and facilities, (such as temporary construction camps, roads, airfields, storage areas and transport and communication systems) are considered to be parts of the Project.

The preparation of the appropriate components of the EIS by the Proponent shall be suitably co-ordinated in order to facilitate a logical review.

3. DEFINITION OF TERMS

The following definitions of terms are used in this document:

Associated Projects

- construction, manufacturing, transportation and similar projects that will be required or will follow as a direct result of the initiation of the Project.

Environmental Assessment Panel (Panel)

- a group of experts appointed to review an Environmental Impact Statement and advise the Minister of the Environment.

Environmental Impact Statement (EIS)

- a documented assessment of the environmental consequences of an intended project, or group of projects, which may have significant environmental consequences. The EIS is completed early in the planning stages of development in accordance with guidelines established by the Panel for that undertaking.

Initiator

- a federal department or agency which intends to undertake or sponsor a project, or group of projects, having potential environmental effects and which is thereby required to take appropriate action according to the Environmental Assessment and Review Process.

Project

- all activities directly associated with works, facilities, services and activities required to construct and operate the system and all routing, construction and operation, and scheduling and design alternatives under active consideration at the time the EIS is prepared.

Project Area

- includes all rights-of-way, permanent and temporary, for the construction and operation of the Project, such as that required for the pump and compressor stations, equipment and material storage areas, docks, airfields, helicopter pads, roads, construction camps, borrow areas, water supply areas, waste disposal areas, and such undefined contiguous areas as may reasonably be considered to

be subject to impact from Project activities.

Proponent

- a company, province or other organization outside the federal government which intends to undertake a project having potential environmental effects; and is within the scope of the Environmental Assessment and Review Process.

4. OVERVIEW SUMMARY

The Overview Summary will consolidate the important findings of the report and will be written in such a manner as to allow reviewers to focus immediately on items of concern. It should be written in terms understandable to the general public and in a format that allows it to be extracted directly for publication by the media, or for use by senior executives requiring a quick appraisal of the situation.

The Summary is to be published separately as well as being included in the EIS and must briefly describe the Project, the probable major environmental impacts, the avoidance and/or mitigating measures to be implemented, and the significance of the residual environmental impacts. Any aspects of the development which might raise public concern should be described clearly. The Summary must also

identify data gaps or knowledge deficiencies, and the limitations these have imposed on the Environmental Impact Statement.

5. THE PROJECT SETTING

5.1 Declaration and Objective

The Proponent and Initiating Department for the Project must be identified and must assume full responsibility for statements and judgements in the Environmental Impact Statement.

The objective of the project should be clearly stated, in terms of social, economic and environmental parameters, i.e. costs and benefits and beneficiaries, social benefits, etc.

5.2 The Need

A description should be made of the demand or need for the proposed Project referring to other more detailed submissions or presentations made to meet other government requirements. This should include the trade-offs between the benefits of the Project and its environmental disbenefits. The principal purpose of this section is to indicate the economic perspective against which potential environmental impacts may be judged. Therefore an outline should be given of historic, existing, and probable future demands for natural gas and the location of such demands.

5.3 Alternatives

Briefly review the major routing, timing, logistic, and design alternatives considered during the course of selecting the alternative for which this Environmental Impact Statement is prepared and describe the basis on which each alternative was rejected in favour of the selected alternative. If possible, describe the significant differences in environmental impacts among the alternatives considered.

Summarize the routing, timing, logistic and design alternatives still under active consideration for this project and describe the advantages and disadvantages of each. Include: details of the energy budget for the transport of gas from the Mackenzie Delta to the Whitehorse terminus on an input basis through the pipeline, including an estimate of the gas loss due to transportation through the pipeline.

5.4 Associated Projects

The relationship of the proposed Project to other existing or proposed projects should be discussed, particularly from the standpoint of cumulative environmental impacts. This section should also identify the possible environmental concerns that might arise through the stimulated development of

Associated Projects. These may include the building and operation of linking pipelines to other markets, in addition to the main linkages. The possibility of shared use of a utility corridor should be discussed. Future supply/demand scenarios which could lead to "looping" to increase delivery capacity from the Mackenzie Delta should be included.

6. DESCRIPTION OF THE PROPOSED PROJECT

The EIS is to include a clear description of the proposed project, both at completion and in its various phases, so that predicted impacts can readily be related to specific features of the proposal. A project construction schedule should be included together with estimates of the cost and design life of the facility. Topographic or photomosaic maps of suitable scale should be used to depict the route location and the locations of rights-of-way, new access roads (permanent or temporary), borrow areas, waste and spoil disposal sites, chilling and compressor stations, aircraft landing facilities, storage areas, construction camps, communication sites and other ancillary facilities. Future plans to loop the pipeline should be outlined as well. In addition, the description should include, but not necessarily be limited to, the following detail:

6.1 Pre-construction

- a) nature, proposed scheduling, methods, and extent of right-of-way surveys, including road and helicopter movements, and man-camp arrangements;
- b) proposed schedule and method of right-of-way clearing, extent of clearing, and method(s) of disposal of slash;
- c) location, proposed scheduling and detail of all stream crossings;
- d) location and detail of access roads.

6.2 Construction

- a) all plant and operating units to be constructed, such as compressor stations, unloading and storage facilities, communication installations;
- b) the method, routing and timing of pipe delivery, and construction procedures to be used for all mainline and lateral pipelines in the system;
- c) plans for the transportation of personnel, equipment, supplies, water and other items moved by road, rail, barge or aircraft;
- d) typical designs to overcome problems associated

with a chilled pipe in frozen and unfrozen ground and a warm pipe in frozen and unfrozen ground. Specific attention should be addressed to design and construction-timing in ice-rich permafrost and to subsequent problems of frost heave and/or thaw settlement. For each such typical design, detailed quantitative geo-technical, hydrologic, meteorologic, or other relevant technical data should be provided for a representative site or interval along the pipeline route at which the design would be employed;

- e) design and proposed scheduling of stream and lake crossings and approaches:
 - 1. detailed design of all major stream and lake crossings, including approaches, for which special crossing crews would be employed; each such design should be supported by detailed quantitative geo-technical, hydrologic, meteorologic, or other relevant technical data.
 - 2. typical designs for stream or lake crossings for which mainline crews would be employed; for each such typical design, detailed quantitative geotechnical, hydrologic, meteorologic, or relevant technical data should be provided for a representative crossing at which the design would be employed.

- f) location and design of shut-off valves;
- g) schedules for construction by spread;
- h) total number of project personnel in conjunction with construction camp details such as size including area occupied, period of use, water supply, sewage treatment systems and evidence of capability to adhere to receiving water quality standards;
- i) storage sites for fuel and hazardous chemicals and materials, and handling procedures during construction;
- j) requirements for construction materials such as concrete aggregate, granular fill, rip-rap, and the locations of borrow sites;
- k) location and standards of temporary and permanent access roads, including snow roads, culvert designs and installation, and methods of road construction;
- l) plans for disposal of timber and vegetation from the right-of-way clearing operations;
- m) designs to accommodate seismic activity;

- n) designs and procedures to maintain slope stability;
- o) details of hydrostatic testing and line purging procedures;
- p) methods to deal with the effects of aufeis development;
- q) details of contingency planning for the handling of environmental emergencies such as fires, spills of hydrocarbons and hazardous chemicals;
- r) plans for monitoring and controlling environmental impacts throughout the construction phase;
- s) locations and methods of spoil dumping, and solid waste disposal methods;
- t) total water use for all operations, including line testing and purging. Give water sources and disposal details, including an inventory of each lake or waterbody involved in water use.

6.3 Post-Construction Restoration

- a) plans for removal, future use or other disposition of temporary structures and facilities, hydrocarbons and hazardous chemicals;
- b) plans for temporary roads, bridges, and culverts;

- c) plans for the rehabilitation and re-vegetation of disturbed areas, such as gravel pits, quarries and rights-of-way;
- d) detailed plans for grading and re-vegetation at several locations which are representative of vegetation, soil, and permafrost conditions existing along the route;
- e) details on methods of blocking or removing access to abandoned facilities.

6.4 Operation and Maintenance

- a) commissioning or start-up procedures for the project;
- b) technical and operational procedures, including timing schedules, flow diagrams and possibilities of electrical power for compressors, and arrangements for inspections;
- c) normal maintenance, including cleaning and purging operations requiring noise control or other measures, routine scheduled maintenance, anticipated maintenance problems and plans for any partial or complete shutdown for maintenance;
- d) right-of way maintenance and surveillance methods

including final right-of-way grading and re-vegetation proposals;

- e) contingency plans for gas ruptures and blowouts and for spills of hydrocarbons and hazardous chemicals;
- f) contingency plans for repair of ground failures on or adjacent to the right-of-way.

6.5 Abandonment

- a) relocation or termination plans for all pipeline and related facilities.

7. EVALUATION OF ALTERNATIVES

The alternatives considered within and outside of the chosen corridor in selecting the specific mode and location or alignment of the pipeline and location of compressors should be equally evaluated and discussed with respect to environmental impact.

8. ENVIRONMENTAL SETTING

The purpose of this section is to provide the necessary background information against which the predicted environmental impacts are to be considered.

In describing the existing environment, the EIS should emphasize site specific, unique, or sensitive environmental features of particular importance which could be affected by the project.

The description must relate to the assessment of potential environmental impact in the right-of-way and adjacent affected areas. A qualitative and quantitative description of resource uses that may be affected should be included.

Maps of appropriate scale (including photomosaic maps) should be included to illustrate resource and environmental information. The following list of environmental features is provided for guidance:

8.1 Climate

- a) extremes and means of monthly temperature, numbers of frost-free days and freeze-thaw cycles on an annual basis;
- b) monthly precipitation, frequency of freezing precipitation and depth and duration of snow cover;
- c) prevailing wind speed and direction, frequency, persistence, extent and location of temperature inversions; fog, including ice fog; smoke and haze.

8.2 Terrain

- a) topographic, physiographic and geologic features, as well as geomorphic processes within the project area;
- b) physical and chemical characteristics of the soil, soil profile classification, depth, total overburden depth, and petrology of rocks present;
- c) permafrost (continuous and discontinuous) distribution and temperatures, ice content, characteristics of active layer development, and the extent and character of permafrost degradation problems;
- d) erosion potential of slopes, and recognized physical hazards such as landslides, mud flows, avalanches, and seismic activity along the route;
- e) extent and nature of unique geological and landform features;
- f) identification and availability of material suitable for borrow, including rock for rip-rap.

8.3 Hydrology and Limnology

- a) description of physical, chemical and biological parameters in waters, including ground water,

likely to be affected, including seasonal water quantity and quality regimes; ice scour; ice jams; channel migration potential;

- b) data necessary to evaluate effects of water uses in all project phases, including discharge, alteration of watercourses, use of coffer dams, etc.;
- c) data necessary to evaluate the effects of withdrawal and disposal of water for hydrostatic pipe testing.

8.4 Vegetation

- a) biogeoclimatic zones and forest cover, including forest stand structure and maturity;
- b) plant communities within the proposed corridor, indicating relative abundance of species, importance to man, and importance to native fauna as habitat and food;
- c) undisturbed, rare or unique vegetation; plant life of special economic, historic, social, or aesthetic value;
- d) fire hazard in the pipeline right-of-way; the flammability of vegetation at different times of year.

8.5 Fish and Wildlife

- a) abundance and seasonal distribution, within the project area, of those species of fish, amphibians, birds and mammals considered to be of significance with respect to recreational, commercial, scientific, ecological, aesthetic, subsistence or domestic use value;
- b) rare or endangered species which may be affected by the project, including raptors;
- c) locations and timing of fish migration, spawning, rearing and overwintering relative to the project including water-course crossings, chronology of fish life cycles emphasizing critical points in the cycle;
- d) timing, location and extent of waterfowl nesting and staging;
- e) habitat areas critical to the life cycles of wildlife, including waterfowl staging and moulting areas, leks, mineral licks, denning and nesting areas, migration routes, water crossings, winter ranges, lambing/calving areas, etc. of big game animals, fur bearers, or other economically or recreationally valuable species;
- f) ranges, movements and population dynamics of the Porcupine caribou herd in relation to all aspects of the pipeline and associated activities, and the

possibilities for impact on the Fortymile caribou herd should it increase and occupy historic habitat;

- g) commercial, recreational, domestic and native food fishing activities, harvest and exploitation rates, and the ability of fish populations to withstand increased fishing pressure resulting from improved public access;
- h) hunting and trapping activities, harvests and exploitation rates, and the ability of wildlife populations to withstand increased hunting pressure resulting from improved public access;
- i) biological data on wildlife populations in sufficient detail to permit an estimation of the impact of the project and the design of mitigating measures.

9. LAND, RESOURCE, DEMOGRAPHIC AND SOCIAL SETTING

The following information may be provided either by the proponent or by the initiating department. This type of information will assist the Panel to better assess the environmental impact of the project within the land, resource, demographic and social setting of the areas potentially affected.

9.1 Land and Resource Use

- a) the nature, extent and location of present and projected utilization of land and resources which have potential to be affected by the project, including uses such as: agriculture, forestry, mining, parks and recreation areas, game preserves and sanctuaries, potential reserves under the International Biological Program, critical habitat areas, traditional hunting, fishing and trapping areas, archaeological and historic sites;
- b) other linear developments such as highways, roads, railroads, pipelines, and transmission lines which taken together with the pipeline project, might have cumulative effects;
- c) information and data on the extent and location of Crown and private lands including parks, settlements, reserves under the International Biological Program as well as other entitlements or special status areas;
- d) unique natural aesthetic features within and adjacent to the right-of-way including wilderness values;
- e) regional and local land use plans and policies in so far as these are current and publicly stated.

9.2 Demography and Social Setting

- a) characteristics of the population including numbers, distribution, communities, employment, public facilities and housing;
- b) economic and recreational setting and other elements of the life style that bear on the environmental impact on the region;
- c) attitude of the local population towards the environmental impact of the project;
- d) ability of local communities to accommodate workers, other than those employed by the proponent and living in the proponent's campsites during construction, and the need to provide and service new town sites, trailer parks or other housing arrangements and in particular the environmental effects of creating such new developments.

9.3 In-Migration and New Infrastructure

- a) quantitatively describe expected project population and support populations together with support services and facilities in relation to the assessment of environmental impacts of the project.

10. DESCRIPTION AND ASSESSMENT OF ENVIRONMENTAL IMPACTS

The EIS should describe expected environmental impacts of the proposal, with emphasis on impacts which are likely to cause major environmental disruptions. These can be defined as impacts, either long-term or short-term, single or cumulative in nature, that:

- 1) enhance, disrupt, impair or destroy existing features, conditions or processes in the natural environment;
- 2) cause enhancement of, or conflict with, established, traditional or historic land use and ways of life, including archaeological sites;
- 3) affect the livelihood or health of segments of the human populations; and
- 4) significantly change the environmental options.

The planning of other study programs to assess potential impacts must take into account, for example, the deficiencies in environmental information identified during the initial hearings on the Alaska Highway Gas Pipeline Proposal, as well as other sources. Where factual data are unavailable or of questionable quality, the EIS should clearly state that the predicted impact is based on subjective judgment, and that knowledge gaps exist. Impacts should be considered for the pre-construction, construction, operation and abandonment phases of the project, and should include but not be limited to

parameters listed in Section 8 of these guidelines.

11. MITIGATION OF IMPACTS

One function of the Environmental Impact Statement is to determine the extent to which the adverse environmental impacts of the proposal can be minimized or eliminated by implementing either stringent design standards or other mitigating measures. Options and measures available to avoid or mitigate harmful effects, or to enhance beneficial effects, should be discussed in the EIS. These might include such measures as: changes in location or design of the project; changes in scheduling of activities; rehabilitation of disturbed features; contingency plans; environmental education of construction and operational staff; enhancement of beneficial impacts; and surveillance and monitoring of environmental effects.

Explicit plans for impact mitigation should be outlined in terms which shall include, where appropriate, but are not necessarily restricted to, the topics identified in Appendix A.

Mitigation measures which are outside of the control of the proponent should also be identified.

12. RESIDUAL IMPACTS

Environmental impacts that will remain, despite mitigating measures, should be detailed in terms of their nature,

extent, probable duration and significance. Of particular importance are those impacts which will foreclose certain options and opportunities with respect to future resource use and productivity, and land use in the pipeline corridor. Impacts outside of the control of the proponent should be described.

Should further information be required to fully assess a particular impact and to provide for its mitigation, the proponent should propose studies to obtain information necessary for completing the assessment.

13. ASSOCIATED PROJECTS

The EIS should consider the relationship of the proposal to other existing or planned projects, including those not controlled by the proponent. In particular the relationships with the Dempster Highway, Alaska Highway Gas Pipeline, power projects, electrification of compressor and chilling stations should be discussed. It should identify possible environmental concerns that might arise from stimulated development both of and by these associated projects. The possibility of further linear developments within the corridor, including shared use of the corridor, should also be discussed.

14. ANNEXES

Annexes to the EIS should include a list of references cited and copies of reports developed from studies associated with the environmental impact assessment.

APPENDIX A

Details of Construction and Operation, and Maintenance Plans and Mitigative Measures Relative to Potential Areas of Environmental Impact

The following are examples of impacts requiring mitigative measures and details of construction, operation and maintenance plans required for areas where environmental impact may be anticipated.

1. Terrain and Vegetation

- a) methods of handling potential problems arising from earthquakes, landslides, avalanches, and other mass movements; design of pipeline and auxiliary buildings with reference to the mitigation of such hazards;
- b) methods of minimizing disturbance of vegetation and the organic mat in permafrost or high ice-content areas;
- c) methods of minimizing instability due to differential thaw or freezing, freezing of unfrozen ground, loss of ground strength, and thermokarst in permafrost areas;

where uneven settlement or heave is inevitable, safeguards against pipe rupture or deformation should be proposed;

- d) terrain stabilization and erosion control procedures including: revegetation, diversion or flow control structures, and erosion-resistant material;
- e) plans for mining and borrow pit operations, including dimensions and volumes of excavations; location in relation to possible inter-actions with water bodies including methods of dealing with acid drainage problems in the Eagle Plains area;
- f) borrow pit restoration including stabilization, revegetation, and disposition of surplus borrow materials;
- g) proposed cuttings through forest; provisions for forest preservation, the utilization of timber;
- h) locations and methods of blasting; controls on proposed use of explosives (in particular in or near water bodies, sheep ranges, and raptor eyries);
- i) plans for minimizing drainage disruption; extent of drainage disruption, where it is expected;

- j) methods of preserving the natural setting through the design and location of permanent facilities and the creation of buffer strips of natural vegetation between pipeline facilities, and public roads and facilities;
- k) plans to schedule clearing and actual pipeline construction so that a lengthy interval does not occur between the two operations.

2. Stream, River and Lake Crossings

- a) details of assessment of design flood and method of determination; water crossing designs and scheduling as related to interruption of spawning, rearing and safe upstream and downstream passage of fish;
- b) for crossings beneath the watercourse - depth and location of maximum anticipated scour; proposed design depth and method of placement of pipe; anticipated flow blockages either by exposed pipe acting as a direct barrier or by ice buildup around a chilled pipeline;
- c) pipeline routes through areas of water with potential for shorefast or drifting ice; relation of depth and location to ice flows, pressure ridges, and ice scouring (e.g. Mackenzie River and Delta);
- d) depth of burial and associated construction activities in relation to the elimination of habitat for bottom-dwelling organisms and to sub-lake or river permafrost;

- e) details of project on associated runoff, bank erosion, migration of stream channels, river regime modification, ice jams, and icings;
- f) plans for fish passage structures where structure change or velocity barriers impede fish movement;
- g) design of approaches to river crossings so as to maintain stability of valley walls and river banks and to minimize changes that could lead to slope failures, gullyng, entry of suspended solids, changes in water levels, degradation of growth of ground ice;
- h) the design of culverts under access roads, and of overhead pipe spans for small stream and gully crossings; for culverts include predicted velocity profiles (lateral and longitudinal);
- i) methods to be used in the construction and removal of temporary stream crossings (e.g. materials to be used for reinforcement of ice bridges);
- j) pipeline routes under water bodies with potential for vessel traffic and anchorage (e.g. Mackenzie, Peel and Yukon Rivers); relation of maximum depth of anchor drag to the depth of pipeline burial;
- k) specific measures designed to ensure the safety of underwater pipelines.

3. Other Water Resource Subjects

- a) the hydrological and biological impact of water utilization in terms of planned sources, volumes required, and timing of extraction and reinjection;
- b) methods of minimizing the addition of sediment and the introduction of hydrocarbons and hazardous chemicals into water bodies, particularly in respect to access roads or bridges;
- c) methods of minimizing the addition of sewage effluents into water bodies;
- d) dates and proposed methods of construction within 300 feet of any water body frequented by fish and for activities involving a continuous downslope to a water body; presentation or creation of buffer strips of natural vegetation between pipeline facilities and water bodies;
- e) interruption of river flows and alteration of lake levels in terms of timing and impact.

4. Fish and Wildlife

- a) schedules of construction activities and evidence that the project contains the flexibility to allow pipeline,

road, or other construction to cease for periods of time when important areas critical to fish, mammals or birds are temporarily threatened;

- b) methods of minimizing the restriction of movement of migratory animals (in particular large animals such as moose, Dall sheep, deer, caribou and especially the large group known as the Porcupine caribou herd);
- c) plans for routing around or otherwise protecting areas used as: feeding or nesting areas by migratory waterfowl or any rare or endangered bird species, including raptors; as habitat by fur-bearers or big game animals; areas critical to the life cycles of wildlife;
- d) methods of minimizing disturbance of wildlife populations resulting from greatly increased human intrusions - the operations of boats, ground vehicles, aircraft, and compressor or pumping stations;
- e) safeguards proposed for the habitats of rare or endangered species;
- f) plans for assessing and controlling potential overfishing and hunting;
- g) plans to restore fish and wildlife habitats that are damaged by pipeline activities;
- h) plans to minimize man-bear conflicts at project camps and facilities.

5. Waste, Toxic Materials and Noise

- a) methods of solid waste collection and disposal to avoid health hazards, dispersal by wind, or attraction of wild animals;
- b) waste incineration procedures designed to minimize air pollution, ice fog development, and fire hazards;
- c) treatment and disposal of sewage with provisions to prevent seepage or leakage which may contaminate the surrounding environment (ref. also 3.c);
- d) the nature, transportation, use and disposal of any pesticides, herbicides, pipe coating materials, anti-corrosion materials, photographic chemicals, flushing agents, or other toxic substances, proposed for the project and information on their expected persistence, toxicity and mobility in surrounding ecological systems; toxic materials storage facilities, distance from nearest watercourse;
- e) plans for compressor station silencing equipment and/or physical barriers to noise; the level and frequency distribution of noise generated by construction and operations equipment;
- f) proposed volume, sources, composition and disposal of

pipeline test fluids;

- g) methods of disposal, incineration or other control of gaseous and liquid wastes from compressor/pumping stations, flare pit operation if used, or anticipated quantities of other emissions to the atmosphere;
- h) measures to ensure that there will be no discharge of petroleum products or other pollutants into or onto any lands or waters;
- i) methods of disposal or utilization of cleared trees and vegetation; procedures for slash disposal particularly in permafrost, sensitive or populated areas, near water bodies, etc.;
- j) methods of preventing or minimizing sediment, slash or other waste introduction to water bodies;
- k) methods of disposal of waste materials collected during pipeline "pigging" operations (if used);
- l) composition, quantities, and disposal of materials for pipeline purging (if used);
- m) methods to minimize ambient pollutant levels arising from compressor station gas turbine operation.
Assessment of the effect of these pollutants on the surrounding ecosystem during normal and "worst-case"

meteorological conditions (site-specific assessment of buildup under thermal inversion conditions).

6. Land and Resource Use

- a) methods to reduce environmental impact on land uses and capabilities on or near the pipeline corridor; details of any relocations or other mitigation measures which may be required relative to the project;
- b) probable temporary restrictions on land uses and capabilities during construction; effect of construction on highway traffic patterns;
- c) methods to avoid or reduce impacts on Crown and private lands including parks, settlements, potential reserves under the International Biological Program as well as other entitlements or special status areas;
- d) methods of reducing the impact of the pipeline and its construction on those natural resources from which a person or persons may derive any part or all of their livelihood by trapping, hunting, and/or fishing;
- e) details of surveys intended to identify archaeological, historic, and unique natural and aesthetically pleasing sites prior to and during the construction phase; procedures designed to ensure the preservation of such sites.

7. Environmental Emergencies

7.1 Gas

- a) the statistical probability of accidental loss of the gaseous product from the pipeline, and the probable quantity of such loss;
- b) the probable effects on people and on any environmental components, of the accidental ignition of combustible products, inadvertently released from the pipeline including under-water and under-ice releases;
- c) the adequacy, accuracy and effectiveness of routine methods and of systems for leak detection, and the maximum rate of loss of the product from the pipeline that could go undetected;
- d) contingency plans and response procedures by the proponent and by government agencies for containment and suppression of fires resulting from the accidental ignition of escaping gases, including:
 - i) provisions for the prevention of pipeline ruptures and control of escaping gases or other toxic materials;
 - ii) methods and procedures for restoration of the affected components of the environment;

- e) methods of fire prevention and suppression in the corridor including the maintenance of the necessary equipment caches and the availability of properly trained personnel for fire fighting in all areas where the pipeline crew's activities may cause fires.

7.2 Oil and Hazardous Chemicals

- a) contingency plans and response procedures for the protection and the safe removal and disposal of products accidentally or inadvertently released into the environment, including:
 - i) provisions for the prevention and control of accidental spills of petroleum products and other toxic materials;
 - ii) spill containment and disposal procedures, equipment, and equipment stockpile locations;
 - iii) techniques for spill clean-up under all seasonal conditions on land, into water bodies and at major depots and storage areas;
 - iv) methods and procedures for restoration of the affected components of the environment;
- b) methods of fire prevention and suppression for all flammable liquids and solids.

